

A Cryogenic Flow Sensor, Phase I

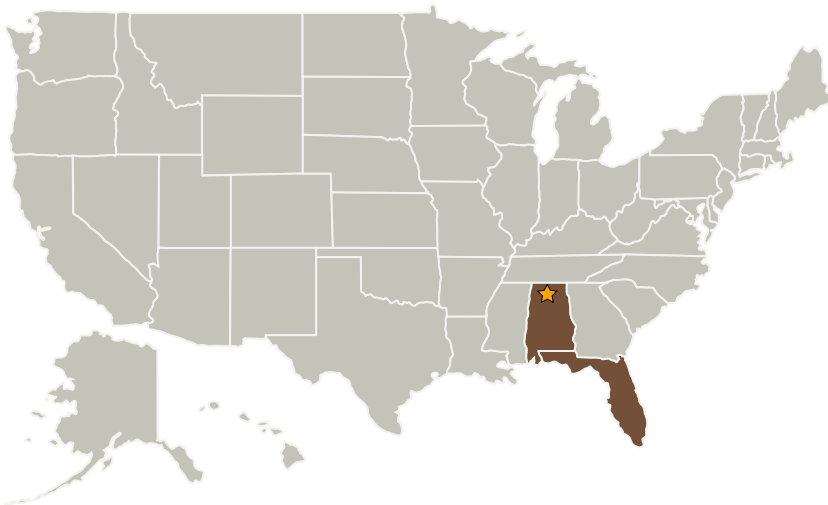
Completed Technology Project (2005 - 2005)



Project Introduction

Advanced Technologies Group, Inc. proposes the development of a Cryogenic Flow Sensor (CFS) for determining mass flow of cryogenics in spacecraft propellant management. Current point sensor technology is incapable of determining high pressure, high flow rate cryogenic fluid quality and mass flow rate, and has proven to be inaccurate in attempting to rapidly measure cryogen depletion. If there is an abrupt change in fluid quality, turbo-machinery can over-speed causing catastrophic failure. The CFS will provide a means to avoid these failures as well as providing fluid quality data for a wide range of flow systems. Experimental hardware was able to detect the onset of two-phase flow and the presence of debris in the flow of water. The innovation clearly shows that it can discern between entrained gas bubbles and unwanted debris. The sensor has the potential to determine size and quantity of the contaminant. In addition, a non-intrusive method for determining the Mass-Flow?Rate of the fluid propellant has been designed, and is the focus of this phase I effort. A cryogenic sensor with these capabilities is very desirable to the cryogenic fluids management community, as well as other fluid management systems, and has many commercial applications.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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| Organizations Performing Work | Role | Type | Location |
|---------------------------------------|-------------------------|-------------|---------------------|
| ★ Marshall Space Flight Center (MSFC) | Lead Organization | NASA Center | Huntsville, Alabama |
| Advanced Technologies Group, Inc. | Supporting Organization | Industry | Stuart, Florida |

Primary U.S. Work Locations

| | |
|---------|---------|
| Alabama | Florida |
|---------|---------|

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

John Justak

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.2 Thermal Control Components and Systems
 - └ TX14.2.8 Measurement and Control